What is claimed is:

1. A system for use in tomographic imaging of a scattering medium, comprising:

an energy source for emitting a signal and having at least one energy transmitter coupled thereto; and

a detection system coupled to the energy source and including at least one energy receiver for measuring dynamic properties of the scattering medium.

2. The system of claim 1, further including an imaging head coupled as the energy transmitter and energy receiver for holding thereof.

3. The system of claim 1, wherein the detection system further comprises at least one lock-in amplifier for separating a signal emitted by at least one energy source.

4. The system of claim 1, wherein the detection system further includes at least one gain adjustment means for increasing dynamic range of the detector system.

5. The system of claim 1, wherein the detection system further includes a sample-and-hold circuit for freezing the signal emitted by the energy source.

6. The system of claim 5, wherein the sample-and-hold circuit further includes logic for allowing simultaneous readout for each detector fiber.

7. The system of clam 1, wherein the energy source includes at lest one of non-laser optical sources, LED and high-pressure incandescent lamp, laser diodes, solid state lasers, titanium-sapphire laser, ruby laser, dye laser, electromagnetic sources, acoustic energy, acoustic energy produced by optical energy, optical energy, and combinations thereof.

8. The system of claim 1, wherein data acquisition from the detection system is about 150Hz.

9. The system of claim 1, wherein the energy source includes a plurality of near infra red laser diodes to transmit multiple wavelengths.

10. A detection system to collect data about the dynamic properties of a scattering medium, comprising:

at least one energy receiver for detecting a signal from an energy source; and

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a programmable gain instrumentation amplifier for increasing the dynamic range of the signal which provides rapid data acquisition about the dynamic properties of the scattering medium.

11. The detection system of claim 10, wherein the energy receiver includes at least one of a photo-diode, PIN diode, Avalanche photodiodes , change couple device, change inductive device, photo-multiplier tubes, multi-channel plate, acoustic transducers, and any combinations thereof.

12. The detection system of claim 10, further including a sample-and-hold circuit coupled to the programmable gain instrumentation amplifier that allows simultaneous readout of a plurality of signals from the energy source.

13. A system for use in optical tomographic imaging of a scattering medium comprising:

at least one energy transmissive fiber bundle coupled to an energy source;

an imaging head for holding the energy transmissive fiber bundle; and

a detection system for collecting data about the optical dynamic properties of the scattering medium.

14. The system of claim 13, wherein the fiber bundle is bifurcated to both transmit and detect energy.

15. The system of claim 13, wherein the fiber bundle only transmits energy.

16. The system of claim 13, wherein the imaging head is a folding sphere or polygon.

17. The system of claim 16, wherein the polygon is a polyhedron or a trapezoidal icosatetrahedron, or a hemitrapezoidal icosatetrahedron..

18. The system of claim 16, wherein the fiber bundle is disposed about the imaging head.

19. The system of claim 13 wherein the fiber bundle has a diameter of about 3 mm.

20. The system of claim 13, wherein the imaging head further includes adjustment means for accommodating different size medium, stabilizing the medium against motion artifacts, conforming the target to a simple well-defined geometry and

providing information about the location of at lest the receiver in reference to the location of the transmitter.

21. A method of using optical tomographic imaging, comprising:

(a) exposing a scattering medium to near infra-red light; for collecting data about the dynamic properties of a scattering medium,

(b) detecting light by a detection system; and

(c) enhancing gain through a programmable gain instrumentation amplifier for the purpose of measuring the dynamic properties of the scattering medium.

22. The method of claim 21, wherein the scattering medium is vascular tissues.

23. The method of claim 21, further including separating via at least one lock-in amplifier a plurality of wavelengths transmitted through the medium.

24. The method of claim 21, further including collecting data from simultaneous readouts of a signal.

25. A system for optical tomographic imaging of a medium comprising:

an imaging head having at least one source disposed to direct optical energy into a medium and a plurality of detectors disposed to receive optical energy emerging from the medium, the detectors means being located at a plurality of distances from the source constituting a plurality of distances through the medium the detectors and thee source , the source and detectors forming respective source detector pairs;

a programmable gain amplifier connected to amplify at least one signal of the source detector pairs;

a computer having a data acquisition board for receiving the signal from the programmable gain amplifier and reconstructing an image of the medium.

26. The system of claim 25, wherein the optical energy comprises optical energy of at least two different intensity modulated wavelengths of energy.

27. The system of claim 26, further comprising a filtering means for separating signals corresponding to a wavelength of intensity modulated energy.

28. The system of claim 25, further comprising a sample and hold circuit for holding a desired signal for use in measuring of dynamic properties of the medium.

29. The system of claim 25, wherein the source comprises energy transmissive fibers coupled to an energy emitting source.

30. The system of claim 25, wherein the source comprises a plurality of optical energy sources.

31. The system of claim 25, wherein the source comprises of plurality of laser diodes.

32. The system of claim 25, wherein the detectors are fibers coupled to optical energy detectors.

33. The system of claim 25, wherein the detectors are optical energy detectors.

34. An imaging head comprising

a pad;

a plurality of source means for delivering optical energy to a medium; and

a plurality of detector means for detecting optical energy emerging from a medium, the source means and detector means being attached to the pad in a plurality of rows and columns wherein the plurality of source means are arranged to form at least two unique imaging planes, an imaging plane being between defined by a plane substantially perpendicular to the pad and passing through at least two source means and one detector means.

35. The imaging head of claim 34, wherein a plurality of source means and detector means are joined to form combined source detector means, the combined source detector means and detector means being arranged in an alternating rows of a first pattern and a second pattern, the first pattern comprising one combined source detector means followed by three detector means followed by one combined source detector means followed by three detector means followed by one combined source detector means, the second pattern comprising two detector means followed by one combined source detector means followed by three detector means followed by one combined source detector means followed by two detector means.

36. The imaging head of claim 34, wherein the source means are fibers coupled to an optical energy source.

37. The imaging head of claim 34, wherein the source means are optical energy sources.

38. The imaging head of claim 34, wherein the source means is laser diodes.

39. The imaging head of claim 34, wherein the detector means are fibers coupled to optical energy detectors.

40. The imaging head of claim 34 wherein the detector means are optical energy detectors.

41. The imaging head of claim 34 wherein the detector means are photodiodes.

42. An adjustable imaging head of folding polyhedron structure defined by a plurality of scissors pairs having identical rigid angulated truss elements, each trust element having a central pivot point, an internal terminal pivot point and an external terminal pivot point that do not lie on a straight line, each strut being pivotally joined to the other of its pair by their central pivot points, each strut being pivotally joined by the internal terminal pivot point and the external terminal pivot point to the internal terminal pivot point and the external terminal pivot point respectively of another scissors pair, whereby an adjustable ring of principle vertices is formed by the internal terminal pivot points and whereby adjustment causes uniform movement of the principle vertices, the improvement comprising:

at least one source means for delivering optical energy into a medium and at least one detector means for detecting optical energy emerging from a medium, wherein the source means and the detector means are attached to the principle vertices, the source means being oriented to direct optical energy substantially toward a medium in

the center of the ring, the detector means being oriented to receive optical energy emerging substantially from a medium in the center of the ring.

43. The adjustable imaging head of claim 42, further comprising:

amount in communication with a truss element, wherein the mount supports the imaging head and regulates the size of the adjustable ring.

44. The adjustable imaging head of claim 42, further comprising:

a first set of mounts in communication with a first set of diametrically opposed external terminal pivot points;

a second set of mounts in communication with a second set of diametrically opposed external terminal pivot points, wherein the first set of diametrically opposed external terminal pivot points is orthogonal to the second set of diametrically opposed external terminal pivot points,

a drive system in communication with at least one of the mounts in at least one of the first or second sets of mounts, whereby the drive system regulates the size of the adjustable ring.

45. The imaging head of claim 42, wherein the source means are fibers coupled to an optical energy source.

46. The imaging head of claim 42, wherein the source means are optical energy sources.

47. The imaging head of claim 42, wherein the source means are laser diodes.

48. The imaging head of claim 42, wherein the detector means are fibers coupled to optical energy detectors.

49. The imaging head of claim 42, wherein the detector means are optical energy detectors.

50. The imaging head of claim 42, wherein the detector means are photodiodes.

51. An imaging head for use in optical tomography, comprising:

at least one energy receiver;

adjustment means for accommodating different sizes of the medium; and

communication means for transmitting signals from the imaging head to a detection system for use in the measurement of dynamic properties of a scattering medium.

52. The imaging head of claim 49, further including at least one energy transmitter.

53. The imaging head of claim 52, wherein the energy transmitters define an illumination array configured to minimize subsequent numerical effort required for data analysis and maximizing source density covered by the array.

54. The imaging head of claim 53, wherein three dimensional images can be computed from super positioning of the array of two dimensional images.

55. The detection system of claim 10, wherein the energy receiver further detects fluorescence radiation excited by the energy source.

56. The detection system of claim 10, wherein the energy receiver further detects acoustic energy produced in the scattering medium by an optical source.

57. The system of claim 13, wherein the fiber bundle only detects energy.

58. The system of claim 13, wherein the transmissive fiber bundle terminates inside the scattering medium.

59. The method of claim 21, further including the step of evaluating the dynamics in an industrial mixing process for materials selected from the group consisting of powder, gas, liquid, porous material, and combinations thereof.

60. The method of claim 21, further including the step of evaluating dynamics in foggy atmospheres for meteorology.

61. The method of claim 21, further including the step of evaluating dynamics in oceans or water masses.